CLAIMS

1. A method of transmitting data in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

selecting at least one user terminal from among a plurality of user terminals for data transmission in a current scheduling interval, wherein the at least one user terminal includes a user terminal with multiple antennas;

selecting at least one rate for each of the at least one user terminal, wherein each of the at least one rate is selected from among a plurality of rates supported by the system, and wherein each of the plurality of rates is associated with a particular code rate and a particular modulation scheme;

selecting a transmission mode for each of the at least one user terminal, wherein the transmission mode for each user terminal is selected from among a plurality of transmission modes supported by the system; and

scheduling the at least one user terminal for data transmission in the current scheduling interval with the at least one rate and the transmission mode selected for each user terminal.

2. The method of claim 1, further comprising:

selecting a transmission duration for each of the at least one user terminal, and wherein the at least one user terminal is scheduled for data transmission in the current scheduling interval for the transmission duration selected for each user terminal.

3. The method of claim 1, wherein each of the at least one user terminal is scheduled for data transmission on a downlink, an uplink, or both the downlink and uplink in the current scheduling interval.

4. The method of claim 3, wherein for each user terminal scheduled for data transmission on both the downlink and uplink, the at least one rate and the transmission mode for the user terminal are selected independently for the downlink and uplink.

5. The method of claim 2, wherein for each user terminal scheduled for data transmission on both downlink and uplink, the transmission duration for the user terminal is selected independently for the downlink and uplink.

6. The method of claim 1, wherein the plurality of transmission modes include a diversity mode and a spatial multiplexing mode, the diversity mode supporting data transmission with redundancy from a plurality of transmit antennas, and the spatial multiplexing mode supporting data transmission on a plurality of spatial channels.

7. The method of claim 6, wherein the plurality of transmission modes further include a beam-steering mode supporting data transmission on a single spatial channel associated with a highest rate among the plurality of spatial channels.

8. The method of claim 6, wherein the plurality of transmission modes further include a single-input multiple-output (SIMO) mode supporting data transmission from a single transmit antenna to multiple receive antennas.

9. The method of claim 1, wherein the transmission mode selected for each user terminal is dependent on the number of antennas available at the user terminal.

10. The method of claim 1, wherein the MIMO communication system utilizes orthogonal frequency division multiplexing (OFDM).

11. The method of claim 10, further comprising:

selecting a transmission duration, in integer number of OFDM symbols, for each of the at least one user terminal, and wherein the at least one user terminal is scheduled for data transmission in the current scheduling interval for the transmission duration selected for each user terminal.

12. An apparatus in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

a controller operative to

select at least one user terminal from among a plurality of user terminals for data transmission in a current scheduling interval, wherein the at least one user terminal includes a user terminal with multiple antennas,

select at least one rate for each of the at least one user terminal, wherein each of the at least one rate is selected from among a plurality of rates supported by the system,

and wherein each of the plurality of rates is associated with a particular code rate and a particular modulation scheme, and

select a transmission mode for each of the at least one user terminal, wherein the transmission mode for each user terminal is selected from among a plurality of transmission modes supported by the system; and

a scheduler operative to schedule the at least one user terminal for data transmission in the current scheduling interval with the at least one rate and the transmission mode selected for each user terminal.

13. The apparatus of claim 12, wherein the controller is further operative to select a transmission duration for each of the at least one user terminal, and wherein the at least one user terminal is scheduled for data transmission in the current scheduling interval for the transmission duration selected for each user terminal.

14. The apparatus of claim 12, wherein the plurality of transmission modes include a diversity mode and a spatial multiplexing mode, the diversity mode supporting data transmission with redundancy from a plurality of transmit antennas, and the spatial multiplexing mode supporting data transmission on a plurality of spatial channels.

15. The apparatus of claim 14, wherein the plurality of transmission modes further include a beam-steering mode supporting data transmission on a single spatial channel associated with a highest rate among the plurality of spatial channels.

16. The apparatus of claim 12, wherein the MIMO communication system utilizes orthogonal frequency division multiplexing (OFDM).

17. An apparatus in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

means for selecting at least one user terminal from among a plurality of user terminals for data transmission in a current scheduling interval, wherein the at least one user terminal includes a user terminal with multiple antennas;

means for selecting at least one rate for each of the at least one user terminal, wherein each of the at least one rate is selected from among a plurality of rates

supported by the system, and wherein each of the plurality of rates is associated with a particular code rate and a particular modulation scheme;

means for selecting a transmission mode for each of the at least one user terminal, wherein the transmission mode for each user terminal is selected from among a plurality of transmission modes supported by the system; and

means for scheduling the at least one user terminal for data transmission in the current scheduling interval with the at least one rate and the transmission mode selected for each user terminal.

18. The apparatus of claim 17, further comprising:

means for selecting a transmission duration for each of the at least one user terminal, and wherein the at least one user terminal is scheduled for data transmission in the current scheduling interval for the transmission duration selected for each user terminal.

19. The apparatus of claim 17, wherein the plurality of transmission modes include a diversity mode and a spatial multiplexing mode, the diversity mode supporting data transmission with redundancy from a plurality of transmit antennas, and the spatial multiplexing mode supporting data transmission on a plurality of spatial channels.

20. The apparatus of claim 19, wherein the plurality of transmission modes further include a beam-steering mode supporting data transmission on a single spatial channel associated with a highest rate among the plurality of spatial channels.

21. The apparatus of claim 17, wherein the MIMO communication system utilizes orthogonal frequency division multiplexing (OFDM).

22. A method of transmitting data in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

selecting a first user terminal, equipped with a single receive antenna, from among a plurality of user terminals;

transmitting data, based on a first transmission mode, from multiple transmit antennas to the single received antenna of the first user terminal in a first time interval;

selecting a second user terminal, equipped with multiple receive antennas, from among the plurality of user terminals; and

transmitting data, based on a second transmission mode, from the multiple transmit antennas to the multiple receive antennas of the second user terminal in a second time interval, wherein the first and second transmission modes are selected from among a plurality of transmission modes supported by the system.

23. The method of claim 22, further comprising:

selecting a third user terminal, equipped with multiple receive antennas, from among the plurality of user terminals; and

transmitting data, based on a third transmission mode, from the multiple transmit antennas to the multiple receive antennas of the third user terminal in a third time interval, wherein the third transmission mode is selected from among the plurality of transmission modes.

24. The method of claim 22, wherein the plurality of transmission modes include a spatial multiplexing mode supporting data transmission on a plurality of spatial channels formed by the multiple transmit antennas and multiple receive antennas.

25. The method of claim 24, wherein each of the plurality of spatial channels is associated with a respective rate.

26. The method of claim 24, wherein the number of spatial channels used for data transmission in the spatial multiplexing mode is selectable.

27. The method of claim 22, wherein the plurality of transmission modes include a beam-steering mode supporting data transmission on a single spatial channel associated with a highest rate among a plurality of spatial channels formed by the multiple transmit antennas and multiple receive antennas.

28. The method of claim 22, wherein the plurality of transmission modes include a diversity mode supporting data transmission with redundancy from the multiple transmit antennas.

29. The method of claim 28, wherein the diversity mode implements space-time transmit diversity (STTD) supporting transmission of each pair of modulation symbols from a pair of antennas in two symbol periods.

30. The method of claim 28, wherein the diversity mode implements space-frequency transmit diversity (SFTD) supporting transmission of each pair of modulation symbols from a pair of antennas in two subbands.

31. An apparatus in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

a controller operative to select a first user terminal equipped with a single receive antenna and a second user terminal equipped with multiple receive antennas from among a plurality of user terminals; and

a transmit spatial processor operative to

process data based on a first transmission mode for transmission from multiple transmit antennas to the single received antenna of the first user terminal in a first time interval, and

process data based on a second transmission mode for transmission from the multiple transmit antennas to the multiple receive antennas of the second user terminal in a second time interval, wherein the first and second transmission modes are selected from among a plurality of transmission modes supported by the system.

32. The apparatus of claim 31, wherein the controller is further operative to select a third user terminal equipped with multiple receive antennas from among the plurality of user terminals, and wherein the transmit spatial processor is further operative to process data based on a third transmission mode for transmission from the multiple transmit antennas to the multiple receive antennas of the third user terminal in a third time interval, wherein the third transmission mode is selected from among the plurality of transmission modes.

33. The apparatus of claim 31, wherein the plurality of transmission modes include a spatial multiplexing mode supporting data transmission on a plurality of

spatial channels formed by the multiple transmit antennas and multiple receive antennas.

34. The apparatus of claim 31, wherein the plurality of transmission modes include a beam-steering mode supporting data transmission on a single spatial channel associated with a highest rate among a plurality of spatial channels formed by the multiple transmit antennas and multiple receive antennas.

35. The apparatus of claim 31, wherein the plurality of transmission modes include a diversity mode supporting data transmission with redundancy from the multiple transmit antennas.

36. An apparatus in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

means for selecting a first user terminal, equipped with a single receive antenna, from among a plurality of user terminals;

means for transmitting data, based on a first transmission mode, from multiple transmit antennas to the single received antenna of the first user terminal in a first time interval;

means for selecting a second user terminal, equipped with multiple receive antennas, from among the plurality of user terminals; and

means for transmitting data, based on a second transmission mode, from the multiple transmit antennas to the multiple receive antennas of the second user terminal in a second time interval, wherein the first and second transmission modes are selected from among a plurality of transmission modes supported by the system.

37. The apparatus of claim 36, further comprising:

means for selecting a third user terminal, equipped with multiple receive antennas, from among the plurality of user terminals; and

means for transmitting data, based on a third transmission mode, from the multiple transmit antennas to the multiple receive antennas of the third user terminal in a third time interval, wherein the third transmission mode is selected from among the plurality of transmission modes.

38. The apparatus of claim 36, wherein the plurality of transmission modes include a spatial multiplexing mode supporting data transmission on a plurality of spatial channels formed by the multiple transmit antennas and multiple receive antennas.

39. The apparatus of claim 36, wherein the plurality of transmission modes include a beam-steering mode supporting data transmission on a single spatial channel associated with a highest rate among a plurality of spatial channels formed by the multiple transmit antennas and multiple receive antennas.

40. The apparatus of claim 36, wherein the plurality of transmission modes include a diversity mode supporting data transmission with redundancy from the multiple transmit antennas.

41. A method of exchanging data in a wireless time division duplex (TDD) multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

selecting a first set of at least one user terminal for data transmission on a downlink in a current scheduling interval;

selecting a second set of at least one user terminal for data transmission on an uplink in the current scheduling interval;

transmitting data on the downlink to the first set of at least one user terminal in a first time segment of the current scheduling interval; and

receiving data transmission on the uplink from the second set of at least one user terminal in a second time segment of the current scheduling interval, wherein the first and second time segments are time division duplexed in the current scheduling interval.

42. The method of claim 41, further comprising:

selecting a transmission mode, from among a plurality of transmission modes supported by the system, for each user terminal in the first set, and wherein data is transmitted to each user terminal in the first set is based on the transmission mode selected for the user terminal.

43. The method of claim 41, further comprising:

obtaining channel estimates for each user terminal in the first set based on a pilot transmitted on the uplink by the user terminal, and wherein data is transmitted to each user terminal in the first set based on the channel estimates obtained for the user terminal.

44. The method of claim 41, further comprising:

selecting a transmission mode, from among a plurality of transmission modes supported by the system, for each user terminal in the second set, and wherein the data transmission from each user terminal in the second set is based on the transmission mode selected for the user terminal.

45. The method of claim 41, further comprising:

determining timing of each user terminal in the second set; and

adjusting timing of the data transmission on the uplink for each user terminal in the second set based on the determined timing of the user terminal.

46. The method of claim 41, further comprising:

determining received power for each user terminal in the second set; and

adjusting transmit power of the data transmission on the uplink for each user terminal in the second set based on the received power for the user terminal.

47. An apparatus in a wireless time division duplex (TDD) multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

a controller operative to select a first set of at least one user terminal for data transmission on a downlink in a current scheduling interval and a second set of at least one user terminal for data transmission on an uplink in the current scheduling interval;

a transmit spatial processor operative to process data for transmission on the downlink to the first set of at least one user terminal in a first time segment of the current scheduling interval; and

a receive spatial processor operative to receive data transmission on the uplink from the second set of at least one user terminal in a second time segment of the current scheduling interval, wherein the first and second time segments are time division duplexed in the current scheduling interval.

48. The apparatus of claim 47, wherein the controller is further operative to select a transmission mode, from among a plurality of transmission modes supported by the system, for each user terminal in the first set, and wherein data is transmitted to each user terminal in the first set is based on the transmission mode selected for the user terminal.

49. The apparatus of claim 47, wherein the controller is further operative to obtain channel estimates for each user terminal in the first set based on a pilot transmitted on the uplink by the user terminal, and wherein data is transmitted to each user terminal in the first set based on the channel estimates obtained for the user terminal.

50. The apparatus of claim 47, wherein the controller is further operative to select a transmission mode, from among a plurality of transmission modes supported by the system, for each user terminal in the second set, and wherein the data transmission from each user terminal in the second set is based on the transmission mode selected for the user terminal.

51. The apparatus of claim 47, wherein the controller is further operative to determine timing of each user terminal in the second set and to adjust timing of the data transmission on the uplink for each user terminal in the second set based on the determined timing of the user terminal.

52. The apparatus of claim 47, wherein the controller is further operative to determine received power for each user terminal in the second set and to adjust transmit power of the data transmission on the uplink for each user terminal in the second set based on the received power for the user terminal.

53. An apparatus in a wireless time division duplex (TDD) multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

means for selecting a first set of at least one user terminal for data transmission on a downlink in a current scheduling interval;

means for selecting a second set of at least one user terminal for data transmission on an uplink in the current scheduling interval;

means for transmitting data on the downlink to the first set of at least one user terminal in a first time segment of the current scheduling interval; and

means for receiving data transmission on the uplink from the second set of at least one user terminal in a second time segment of the current scheduling interval, wherein the first and second time segments are time division duplexed in the current scheduling interval.

54. The apparatus of claim 53, further comprising:

means for selecting a transmission mode, from among a plurality of transmission modes supported by the system, for each user terminal in the first set, and wherein data is transmitted to each user terminal in the first set is based on the transmission mode selected for the user terminal.

55. The apparatus of claim 53, further comprising:

means for obtaining channel estimates for each user terminal in the first set based on a pilot transmitted on the uplink by the user terminal, and wherein data is transmitted to each user terminal in the first set based on the channel estimates obtained for the user terminal.

56. The apparatus of claim 53, further comprising:

means for selecting a transmission mode, from among a plurality of transmission modes supported by the system, for each user terminal in the second set, and wherein the data transmission from each user terminal in the second set is based on the transmission mode selected for the user terminal.

57. The apparatus of claim 53, further comprising:

means for determining timing of each user terminal in the second set; and

means for adjusting timing of the data transmission on the uplink for each user terminal in the second set based on the determined timing of the user terminal.

58. The apparatus of claim 53, further comprising:

means for determining received power for each user terminal in the second set; and

means for adjusting transmit power of the data transmission on the uplink for each user terminal in the second set based on the received power for the user terminal.

59. A method of exchanging data in a wireless time division duplex (TDD) multiple-input multiple-output (MIMO) communication system, comprising:

receiving a pilot on an uplink from a user terminal;

deriving at least one steering vector for a downlink for the user terminal based on the received pilot; and

performing spatial processing, with the at least one steering vector, on a first data transmission sent on the downlink to the user terminal.

60. The method of claim 59, wherein a single steering vector is derived for the downlink for the user terminal, and wherein spatial processing for beam-steering is performed on the first data transmission with the single steering vector to send the first data transmission via a single spatial channel of the downlink.

61. The method of claim 59, wherein a plurality of steering vectors are derived for the downlink for the user terminal, and wherein spatial processing for spatial multiplexing is performed on first the data transmission with the plurality of steering vectors to send the first data transmission via a plurality of spatial channels of the downlink.

62. The method of claim 59, further comprising:

deriving a matched filter for the uplink for the user terminal based on the received pilot; and

performing matched filtering of a second data transmission received on the uplink from the user terminal with the matched filter.

63. The method of claim 62, wherein the matched filter comprises at least one eigenvector for at least one eigenmode of the uplink, and wherein the at least one eigenvector for the uplink is equal to the at least one steering vector for the downlink.

64. An apparatus in a wireless time division duplex (TDD) multiple-input multiple-output (MIMO) communication system, comprising:

a receive spatial processor operative to receive a pilot on an uplink from a user terminal;

a controller operative to derive at least one steering vector for a downlink for the user terminal based on the received pilot; and

a transmit spatial processor operative to perform spatial processing with the at least one steering vector on a first data transmission sent on the downlink to the user terminal.

65. The apparatus of claim 64, wherein the controller is operative to derive a single steering vector for the downlink for the user terminal, and wherein the transmit spatial processor is operative to perform spatial processing for beam-steering on the first data transmission with the single steering vector to send the first data transmission via a single spatial channel of the downlink.

66. The apparatus of claim 64, wherein the controller is operative to derive a plurality of steering vectors for the downlink for the user terminal, and wherein the transmit spatial processor is operative to perform spatial processing for spatial multiplexing on first the data transmission with the plurality of steering vectors to send the first data transmission via a plurality of spatial channels of the downlink.

67. The apparatus of claim 64, wherein the controller is further operative to derive a matched filter for the uplink for the user terminal based on the received pilot, and wherein the receive spatial processor is further operative to perform matched filtering of a second data transmission received on the uplink from the user terminal with the matched filter.

68. The apparatus of claim 67, wherein the matched filter comprises at least one eigenvector for at least one eigenmode of the uplink, and wherein the at least one eigenvector for the uplink is equal to the at least one steering vector for the downlink.

69. An apparatus in a wireless time division duplex (TDD) multiple-input multiple-output (MIMO) communication system, comprising:

means for receiving a pilot on an uplink from a user terminal;

means for deriving at least one steering vector for a downlink for the user terminal based on the received pilot; and

means for performing spatial processing, with the at least one steering vector, on a first data transmission sent on the downlink to the user terminal.

70. The apparatus of claim 69, wherein a single steering vector is derived for the downlink for the user terminal, and wherein spatial processing for beam-steering is performed on the first data transmission with the single steering vector to send the first data transmission via a single spatial channel of the downlink.

71. The apparatus of claim 69, wherein a plurality of steering vectors are derived for the downlink for the user terminal, and wherein spatial processing for spatial multiplexing is performed on first the data transmission with the plurality of steering vectors to send the first data transmission via a plurality of spatial channels of the downlink.

72. The apparatus of claim 69, further comprising:

means for deriving a matched filter for the uplink for the user terminal based on the received pilot; and

means for performing matched filtering of a second data transmission received on the uplink from the user terminal with the matched filter.

73. The apparatus of claim 72, wherein the matched filter comprises at least one eigenvector for at least one eigenmode of the uplink, and wherein the at least one eigenvector for the uplink is equal to the at least one steering vector for the downlink.

74. A method of transmitting and receiving pilots in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

transmitting a MIMO pilot from a plurality of antennas and on a first communication link, wherein the MIMO pilot comprises a plurality of pilot transmissions sent from the plurality of antennas, and wherein the pilot transmission from each antenna is identifiable by a communicating entity receiving the MIMO pilot; and

receiving a steered pilot via at least one eigenmode of a second communication link from the communicating entity, wherein the steered pilot is generated based on the MIMO pilot.

75. The method of claim 74, wherein the first communication link is an uplink, the second communication link is a downlink, and the communicating entity is a user terminal.

76. The method of claim 74, wherein the first communication link is a downlink, the second communication link is an uplink, and the communicating entity is an access point.

77. The method of claim 74, wherein the pilot transmission from each antenna is associated with a different orthogonal code.

78. The method of claim 74, wherein the steered pilot is received via a single eigenmode of the second communication link and is transmitted at full transmit power from a plurality of antennas at the communicating entity.

79. The method of claim 74, wherein the steered pilot is received via a plurality of eigenmodes of the second communication link.

80. The method of claim 74, wherein the steered pilot is transmitted by the communicating entity for a time duration configurable by the system.

81. An apparatus in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

a transmit spatial processor operative to generate a MIMO pilot for transmission from a plurality of antennas and on a first communication link, wherein the MIMO pilot comprises a plurality of pilot transmissions sent from the plurality of antennas, and wherein the pilot transmission from each antenna is identifiable by a communicating entity receiving the MIMO pilot; and

a receive spatial processor operative to process a steered pilot received via at least one eigenmode of a second communication link from the communicating entity, wherein the steered pilot is generated based on the MIMO pilot.

82. The apparatus of claim 81, wherein the pilot transmission from each antenna is associated with a different orthogonal code.

83. The apparatus of claim 81, wherein the steered pilot is received via a single eigenmode of the second communication link and is transmitted at full transmit power from a plurality of antennas at the communicating entity.

84. The apparatus of claim 81, wherein the steered pilot is received via a plurality of eigenmodes of the second communication link.

85. An apparatus in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

means for transmitting a MIMO pilot from a plurality of antennas and on a first communication link, wherein the MIMO pilot comprises a plurality of pilot transmissions sent from the plurality of antennas, and wherein the pilot transmission from each antenna is identifiable by a communicating entity receiving the MIMO pilot; and

means for receiving a steered pilot via at least one eigenmode of a second communication link from the communicating entity, wherein the steered pilot is generated based on the MIMO pilot.

86. The apparatus of claim 85, wherein the pilot transmission from each antenna is associated with a different orthogonal code.

87. The apparatus of claim 85, wherein the steered pilot is received via a single eigenmode of the second communication link and is transmitted at full transmit power from a plurality of antennas at the communicating entity.

88. The apparatus of claim 85, wherein the steered pilot is received via a plurality of eigenmodes of the second communication link.

89. A method of performing channel estimation in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

receiving a steered pilot via at least one eigenmode of an uplink from a user terminal; and

estimating a channel response of the at least one eigenmode of the uplink for the user terminal based on the received steered pilot.

90. The method of claim 89, further comprising:

deriving a matched filter based on the estimated channel response of the at least one eigenmode of the uplink, wherein the matched filter is used for matched filtering of a data transmission received via the at least one eigenmode of the uplink from the user terminal.

91. The method of claim 89, further comprising:

estimating a channel response of at least one eigenmode of a downlink for the user terminal based on the received steered pilot.

92. The method of claim 91, further comprising:

deriving at least one steering vector based on the estimated channel response of the at least one eigenmode of the downlink, wherein the at least one steering vector is used for data transmission on the at least one eigenmode of the downlink to the user terminal.

93. The method of claim 92, wherein the steered pilot is received via a plurality of eigenmodes of the uplink, wherein the channel response of a plurality of eigenmode of the downlink for the user terminal is estimated based on the received steered pilot, and wherein a plurality of steering vectors are derived based on the estimated channel response of the plurality of eigenmodes of the downlink.

94. The method of claim 93, wherein the plurality of steering vectors are derived to be orthogonal to one another.

95. An apparatus in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

a receive spatial processor operative to receive a steered pilot via at least one eigenmode of an uplink from a user terminal; and

a controller operative to estimate a channel response of the at least one eigenmode of the uplink for the user terminal based on the received steered pilot.

96. The apparatus of claim 95, wherein the controller is further operative to derive a matched filter based on the estimated channel response of the at least one eigenmode of the uplink, wherein the matched filter is used for matched filtering of a data transmission received via the at least one eigenmode of the uplink from the user terminal.

97. The apparatus of claim 95, wherein the controller is further operative to estimate a channel response of at least one eigenmode of a downlink for the user terminal based on the received steered pilot.

98. The apparatus of claim 97, wherein the controller is further operative to derive at least one steering vector based on the estimated channel response of the at least one eigenmode of the downlink, wherein the at least one steering vector is used for data transmission on the at least one eigenmode of the downlink to the user terminal.

99. An apparatus in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

means for receiving a steered pilot via at least one eigenmode of an uplink from a user terminal; and

means for estimating a channel response of the at least one eigenmode of the uplink for the user terminal based on the received steered pilot.

100. The apparatus of claim 99, further comprising:

means for deriving a matched filter based on the estimated channel response of the at least one eigenmode of the uplink, wherein the matched filter is used for matched filtering of a data transmission received via the at least one eigenmode of the uplink from the user terminal.

101. The apparatus of claim 99, further comprising:

means for estimating a channel response of at least one eigenmode of a downlink for the user terminal based on the received steered pilot.

102. The apparatus of claim 101, further comprising:

means for deriving at least one steering vector based on the estimated channel response of the at least one eigenmode of the downlink, wherein the at least one steering vector is used for data transmission on the at least one eigenmode of the downlink to the user terminal.

103. A channel structure for a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

a broadcast channel for transmitting, on a downlink, system parameters and a pilot used for channel estimation of the downlink;

a forward control channel for transmitting, on the downlink, a schedule for data transmission on the downlink and an uplink;

a forward channel for transmitting traffic data on the downlink;

a random access channel for transmitting, on the uplink, user requests to access the system; and

a reverse channel for transmitting traffic data on the uplink.

104. The channel structure of claim 103, wherein the broadcast channel, forward control channel, forward channel, random access channel, and reverse channel are time division multiplexed within a frame having a predetermined time duration.

105. The channel structure of claim 104, wherein the broadcast channel is transmitted first and the forward control channel is transmitted second in the frame.

106. The channel structure of claim 103, wherein the broadcast channel and the forward control channel are transmitted using a diversity mode supporting data transmission with redundancy from a plurality of transmit antennas.

107. The channel structure of claim 103, wherein the forward channel and the reverse channel support a diversity mode and a spatial multiplexing mode, the diversity mode supporting data transmission with redundancy from a plurality of transmit antennas, and the spatial multiplexing mode supporting data transmission on a plurality of spatial channels.

108. The channel structure of claim 103, wherein the random access channel supports a single-input multiple-output (SIMO) mode and a beam-steering mode, the SIMO mode supporting data transmission from a single transmit antenna to multiple receive antennas, and the beam-steering mode supporting data transmission on a single spatial channel associated with a highest rate among a plurality of spatial channels.

109. The channel structure of claim 103, wherein the forward channel and the reverse channel each has a variable time duration.

110. The channel structure of claim 103, wherein the forward control channel and the random access channel each has a variable time duration.

111. The channel structure of claim 103, wherein the schedule includes identities of user terminals scheduled for data transmission on the downlink and uplink.

112. The channel structure of claim 103, wherein the schedule includes a transmission mode and at least one rate for each user terminal scheduled for data transmission on the downlink and uplink, the transmission mode being selected from among a plurality of transmission modes supported by the system, and each of the at least one rate being selected from among a plurality of rates supported by the system.

113. The channel structure of claim 103, wherein the forward channel is further for transmitting a steered pilot on at least one eigenmode of the downlink for a user terminal.

114. The channel structure of claim 103, wherein the reverse channel is further for transmitting on the uplink a second pilot used for channel estimation of the uplink.

115. The channel structure of claim 103, wherein the reverse channel is further for transmitting a steered pilot on at least one eigenmode of the uplink from a user terminal.

116. An apparatus in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

a transmit data processor operative to

process system parameters and a pilot for transmission via a broadcast channel, wherein the pilot is used for channel estimation of the downlink,

process scheduling information for transmission via a forward control channel, wherein the scheduling information is for data transmission on the downlink and an uplink, and

process traffic data for transmission via a forward channel; and

a receive data processor operative to

process user requests received via a random access channel, and

process traffic data received via a reverse channel.

117. The apparatus of claim 116, wherein the broadcast channel, forward control channel, forward channel, random access channel, and reverse channel are time division multiplexed within a frame having a predetermined time duration.

118. The apparatus of claim 116, wherein the broadcast channel and the forward control channel are transmitted using a diversity mode supporting data transmission with redundancy from a plurality of transmit antennas.

119. The apparatus of claim 116, wherein the forward channel and the reverse channel support a diversity mode and a spatial multiplexing mode, the diversity mode supporting data transmission with redundancy from a plurality of transmit antennas, and the spatial multiplexing mode supporting data transmission on a plurality of spatial channels.

120. The apparatus of claim 116, wherein the random access channel supports a single-input multiple-output (SIMO) mode and a beam-steering mode, the SIMO

mode supporting data transmission from a single transmit antenna to multiple receive antennas, and the beam-steering mode supporting data transmission on a single spatial channel associated with a highest rate among a plurality of spatial channels.

121. An apparatus in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

means for processing system parameters and a pilot for transmission via a broadcast channel, wherein the pilot is used for channel estimation of the downlink;

means for processing scheduling information for transmission via a forward control channel, wherein the scheduling information is for data transmission on the downlink and an uplink;

means for processing traffic data for transmission via a forward channel;

means for processing user requests received via a random access channel; and

means for processing traffic data received via a reverse channel.

122. The channel structure of claim 121, wherein the broadcast channel, forward control channel, forward channel, random access channel, and reverse channel are time division multiplexed within a frame having a predetermined time duration.

123. The channel structure of claim 121, wherein the broadcast channel and the forward control channel are transmitted using a diversity mode supporting data transmission with redundancy from a plurality of transmit antennas.

124. The channel structure of claim 121, wherein the forward channel and the reverse channel support a diversity mode and a spatial multiplexing mode, the diversity mode supporting data transmission with redundancy from a plurality of transmit antennas, and the spatial multiplexing mode supporting data transmission on a plurality of spatial channels.

125. The channel structure of claim 121, wherein the random access channel supports a single-input multiple-output (SIMO) mode and a beam-steering mode, the SIMO mode supporting data transmission from a single transmit antenna to multiple receive antennas, and the beam-steering mode supporting data transmission on a single spatial channel associated with a highest rate among a plurality of spatial channels.

126. A method of transmitting signaling information in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

transmitting signaling information for a first set of at least one user terminal at a first rate on a first subchannel of a forward control channel; and

transmitting signaling information for a second set of at least one user terminal at a second rate on a second subchannel of the forward control channel, wherein the second rate is higher than the first rate, and wherein the second subchannel is transmitted after the first subchannel.

127. The method of claim 126, further comprising:

transmitting signaling information for a third set of at least one user terminal at a third rate on a third subchannel of the forward control channel, wherein the third rate is higher than the second rate, and wherein the third subchannel is transmitted after the second subchannel.

128. The method of claim 126, wherein the first subchannel indicates whether or not the second subchannel is transmitted in a current frame.

129. An apparatus in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

a transmit data processor operative to

process signaling information for a first set of at least one user terminal based on a first rate, and

process signaling information for a second set of at least one user terminal based on a second rate that is higher than the first rate; and

a transmitter unit operative to

transmit the processed scheduling information for the first user terminal set on a first subchannel of a forward control channel, and

transmit the processed scheduling information for the second user terminal set on a second subchannel of the forward control channel, wherein the second subchannel is transmitted after the first subchannel.

130. The apparatus of claim 129, wherein the transmit data processor is further operative to process signaling information for a third set of at least one user terminal based on a third rate that is higher than the second rate, and wherein the transmitter unit is further operative to transmit the processed signaling information for the third user terminal set on a third subchannel of the forward control channel, wherein the third subchannel is transmitted after the second subchannel.

131. The apparatus of claim 129, wherein the first subchannel indicates whether or not the second subchannel is transmitted in a current frame.

132. An apparatus in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

means for transmitting signaling information for a first set of at least one user terminal at a first rate on a first subchannel of a forward control channel; and

means for transmitting signaling information for a second set of at least one user terminal at a second rate on a second subchannel of the forward control channel, wherein the second rate is higher than the first rate, and wherein the second subchannel is transmitted after the first subchannel.

133. The apparatus of claim 132, further comprising:

means for transmitting signaling information for a third set of at least one user terminal at a third rate on a third subchannel of the forward control channel, wherein the third rate is higher than the second rate, and wherein the third subchannel is transmitted after the second subchannel.

134. The apparatus of claim 132, wherein the first subchannel indicates whether or not the second subchannel is transmitted in a current frame.

135. A method of receiving signaling information at a user terminal in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

receiving signaling information sent at a first rate on a first subchannel of a forward control channel; and

if signaling information for the user terminal is not obtained from the first subchannel, receiving signaling information sent at a second rate on a second

subchannel of the forward control channel, wherein the second rate is higher than the first rate, and wherein the second subchannel is sent after the first subchannel.

136. The method of claim 126, further comprising:

if signaling information for the user terminal is not obtained from the second subchannel, receiving signaling information sent at a third rate on a third subchannel of the forward control channel, wherein the third rate is higher than the second rate, and wherein the third subchannel is sent after the second subchannel.

137. The method of claim 126, further comprising:

terminating processing of the forward control channel upon encountering decoding failure for a subchannel of the forward control channel.

138. An apparatus in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

a receive data processor operative to

receive signaling information sent at a first rate on a first subchannel of a forward control channel, and

if signaling information for the apparatus is not obtained from the first subchannel, receiving signaling information sent at a second rate on a second subchannel of the forward control channel, wherein the second rate is higher than the first rate, and wherein the second subchannel is sent after the first subchannel; and

a controller operative to direct the processing for the first and second subchannels.

139. The apparatus of claim 138, wherein the receive data processor is further operative to, if signaling information for the apparatus is not obtained from the second subchannel, receive signaling information sent at a third rate on a third subchannel of the forward control channel, wherein the third rate is higher than the second rate, and wherein the third subchannel is sent after the second subchannel.

140. The apparatus of claim 138, wherein the controller is further operative to terminate processing of the forward control channel upon encountering decoding failure for a subchannel of the forward control channel.

141. An apparatus in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

means for receiving signaling information sent at a first rate on a first subchannel of a forward control channel; and

means for, if signaling information for the apparatus is not obtained from the first subchannel, receiving signaling information sent at a second rate on a second subchannel of the forward control channel, wherein the second rate is higher than the first rate, and wherein the second subchannel is sent after the first subchannel.

142. The apparatus of claim 141, further comprising:

means for, if signaling information for the apparatus is not obtained from the second subchannel, receiving signaling information sent at a third rate on a third subchannel of the forward control channel, wherein the third rate is higher than the second rate, and wherein the third subchannel is sent after the second subchannel.

143. The apparatus of claim 141, further comprising:

means for terminating processing of the forward control channel upon encountering decoding failure for a subchannel of the forward control channel.

144. A method of processing data for transmission in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

coding a data frame in accordance with a coding scheme to obtain a coded data frame;

partitioning the coded data frame into a plurality of coded data subframes, one coded data subframe for each of a plurality of spatial channels;

interleaving each coded data subframe in accordance with an interleaving scheme to obtain a corresponding interleaved data subframe, wherein a plurality of interleaved data subframes are obtained for the plurality of spatial channels; and

modulating each interleaved data subframe to obtain a corresponding stream of modulation symbols, wherein a plurality of modulation symbol streams are obtained for the plurality of spatial channels.

145. The method of claim 144, wherein the coded data frame is partitioned by completely filling one coded data subframe at a time.

146. The method of claim 144, wherein the coded data frame is partitioned by cycling through the plurality of coded data subframes for a plurality of iterations and partially filling each coded data subframe with a particular number of code bits from the coded data frame in each iteration.

147. The method of claim 144, wherein each of the plurality of spatial channels is associated with a respective rate, wherein the rate for each spatial channel indicates a particular modulation scheme and a particular code rate to use for the spatial channel, and wherein the particular modulation scheme is selected from among a plurality of modulation schemes supported by the system and the particular code rate is selected from among a plurality of code rates supported by the system.

148. The method of claim 147, wherein the plurality of code rates are obtained based on a single base code and a plurality of puncturing patterns.

149. The method of claim 144, further comprising:

puncturing each coded data subframe to obtain a code rate selected for the spatial channel for the coded data subframe.

150. The method of claim 144, wherein the MIMO system utilizes orthogonal frequency division multiplexing (OFDM).

151. The method of claim 150, wherein the coded data frame is partitioned by cycling through the plurality of coded data subframes for a plurality of iterations and partially filling each coded data subframe with code bits, from the coded data frame, for a group of M subbands in each iteration, where M is greater than one and less than a total number of subbands used for data transmission.

152. The method of claim 151, wherein the interleaving is performed for the code bits for each group of M subbands.

153. The method of claim 150, further comprising:

processing the plurality of modulation symbol streams to obtain a plurality of streams of OFDM symbols, wherein the OFDM symbols have a cyclic prefix length selected from among at least two cyclic prefix lengths supported by the system.

154. The method of claim 150, further comprising:

processing the plurality of modulation symbol streams to obtain a plurality of streams of OFDM symbols, wherein the OFDM symbols are of a size selected from among at least two OFDM symbol sizes supported by the system.

155. An apparatus in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

an encoder operative to code a data frame in accordance with a coding scheme to obtain a coded data frame;

a demultiplexer operative to partition the coded data frame into a plurality of coded data subframes, one coded data subframe for each of a plurality of spatial channels;

an interleaver operative to interleave each coded data subframe in accordance with an interleaving scheme to obtain a corresponding interleaved data subframe, wherein a plurality of interleaved data subframes are obtained for the plurality of spatial channels; and

a symbol mapping unit operative to modulate each interleaved data subframe to obtain a corresponding stream of modulation symbols, wherein a plurality of modulation symbol streams are obtained for the plurality of spatial channels.

156. The apparatus of claim 155, wherein each of the plurality of spatial channels is associated with a respective rate, wherein the rate for each spatial channel indicates a particular modulation scheme and a particular code rate to use for the spatial channel, and wherein the particular modulation scheme is selected from among a plurality of modulation schemes supported by the system and the particular code rate is selected from among a plurality of code rates supported by the system.

157. The apparatus of claim 155, wherein the MIMO system utilizes orthogonal frequency division multiplexing (OFDM).

158. The apparatus of claim 157, wherein the demultiplexer is operative to partition the coded data frame by cycling through the plurality of coded data subframes for a plurality of iterations and partially filling each coded data subframe with code bits, from the coded data frame, for a group of M subbands in each iteration, where M is greater than one and less than a total number of subbands used for data transmission.

159. The apparatus of claim 157, further comprising:

a plurality of OFDM modulators operative to process the plurality of modulation symbol streams to obtain a plurality of streams of OFDM symbols, wherein the OFDM symbols have a cyclic prefix length selected from among at least two cyclic prefix lengths supported by the system.

160. The apparatus of claim 157, further comprising:

a plurality of OFDM modulators operative to process the plurality of modulation symbol streams to obtain a plurality of streams of OFDM symbols, wherein the OFDM symbols are of a size selected from among at least two OFDM symbol sizes supported by the system.

161. An apparatus in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

means for coding a data frame in accordance with a coding scheme to obtain a coded data frame;

means for partitioning the coded data frame into a plurality of coded data subframes, one coded data subframe for each of a plurality of spatial channels;

means for interleaving each coded data subframe in accordance with an interleaving scheme to obtain a corresponding interleaved data subframe, wherein a plurality of interleaved data subframes are obtained for the plurality of spatial channels; and

means for modulating each interleaved data subframe to obtain a corresponding stream of modulation symbols, wherein a plurality of modulation symbol streams are obtained for the plurality of spatial channels.

162. The apparatus of claim 161, wherein each of the plurality of spatial channels is associated with a respective rate, wherein the rate for each spatial channel indicates a particular modulation scheme and a particular code rate to use for the spatial channel, and wherein the particular modulation scheme is selected from among a plurality of modulation schemes supported by the system and the particular code rate is selected from among a plurality of code rates supported by the system.

163. The apparatus of claim 161, wherein the MIMO system utilizes orthogonal frequency division multiplexing (OFDM).

164. The apparatus of claim 163, wherein the coded data frame is partitioned by cycling through the plurality of coded data subframes for a plurality of iterations and partially filling each coded data subframe with code bits, from the coded data frame, for a group of M subbands in each iteration, where M is greater than one and less than a total number of subbands used for data transmission.

165. The apparatus of claim 163, further comprising:

means for processing the plurality of modulation symbol streams to obtain a plurality of streams of OFDM symbols, wherein the OFDM symbols have a cyclic prefix length selected from among at least two cyclic prefix lengths supported by the system.

166. The apparatus of claim 163, further comprising:

means for processing the plurality of modulation symbol streams to obtain a plurality of streams of OFDM symbols, wherein the OFDM symbols are of a size selected from among at least two OFDM symbol sizes supported by the system.

167. A method of accessing a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

receiving system information via a first transport channel on a downlink;

transmitting an access request via a second transport channel on an uplink, wherein the access request is transmitted based on the received system information;

monitoring a third transport channel on the downlink for an acknowledgment of the transmitted access request; and

repeating the receiving, transmitting, and monitoring if the acknowledgment is not received within a predetermined time period.

168. The method of claim 167, wherein the monitoring the third transport channel includes

monitoring an acknowledgment bit in the first transport channel, and

processing the third transport channel for the acknowledgment if the acknowledgment bit is set.

169. The method of claim 167, wherein a plurality of access requests are transmitted.

170. The method of claim 169, wherein the plurality of access requests are transmitted at successively lower rates.

171. The method of claim 169, further comprising:

waiting a pseudo-random period of time prior to transmitting a next access request among the plurality of access requests.

172. The method of claim 169, further comprising:

transmitting a steered pilot along with the access request on the second transport channel, the steered pilot being sent on at least one eigenmode of a MIMO channel for the uplink.

173. The method of claim 167, wherein the system information indicates a time interval in which transmission of access requests is allowed, and wherein the access request is transmitted within the time interval.

174. The method of claim 167, wherein the system information indicates a particular number of slots in which transmission of access requests is allowed, and wherein the access request identifies a specific slot in which the access request is transmitted.

175. The method of claim 174, wherein the slots have a time duration configurable by the system.

176. An apparatus in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

a receive data processor operative to receive system information via a first transport channel on a downlink;

a transmit data processor operative to process an access request for transmission via a second transport channel on an uplink, wherein the access request is transmitted based on the received system information;

a controller operative to monitor a third transport channel on the downlink for an acknowledgment of the transmitted access request, and

wherein the receive data processor is operative to receive updated system information, the transmit data processor operative to process another access request, and the controller operative to monitor the third transport channel if the acknowledgment is not received within a predetermined time period.

177. The apparatus of claim 176, wherein the controller is operative to monitor an acknowledgment bit in the first transport channel and to direct the receive data processor to process the third transport channel for the acknowledgment if the acknowledgment bit is set.

178. The apparatus of claim 176, wherein a plurality of access requests are transmitted.

179. The apparatus of claim 178, wherein the plurality of access requests are transmitted at successively lower rates.

180. The apparatus of claim 178, wherein the controller is operative to wait a pseudo-random period of time prior to initiating transmission of a next access request among the plurality of access requests.

181. The apparatus of claim 178, further comprising:

a transmit spatial processor operative to transmit a steered pilot along with the access request on the second transport channel, the steered pilot being sent on at least one eigenmode of a MIMO channel for the uplink.

182. An apparatus in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

means for receiving system information via a first transport channel on a downlink;

means for transmitting an access request via a second transport channel on an uplink, wherein the access request is transmitted based on the received system information;

means for monitoring a third transport channel on the downlink for an acknowledgment of the transmitted access request; and

means for repeating the receiving, transmitting, and monitoring if the acknowledgment is not received within a predetermined time period.

183. The apparatus of claim 182, wherein the means for monitoring the third transport channel includes

means for monitoring an acknowledgment bit in the first transport channel, and

means for processing the third transport channel for the acknowledgment if the acknowledgment bit is set.

184. The apparatus of claim 182, wherein a plurality of access requests are transmitted.

185. The apparatus of claim 184, wherein the plurality of access requests are transmitted at successively lower rates.

186. The apparatus of claim 184, further comprising:

means for waiting a pseudo-random period of time prior to transmitting a next access request among the plurality of access requests.

187. The apparatus of claim 184, further comprising:

means for transmitting a steered pilot along with the access request on the second transport channel, the steered pilot being sent on at least one eigenmode of a MIMO channel for the uplink.

188. A method of transmitting data in a wireless time division duplex (TDD) multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

estimating a channel response of a first communication link;

determining at least one rate for at least one spatial channel of a second communication link, one rate for each spatial channel, based on the estimated channel response of the first communication link; and

transmitting data on the at least one spatial channel of the second communication link at the at least one rate.

189. The method of claim 188, wherein the first communication link is an uplink and the second communication link is a downlink in the MIMO system.

190. The method of claim 188, further comprising:

estimating signal-to-noise-and-interference ratios (SNRs) of a plurality of spatial channels of the second communication link based on a noise estimate for the first communication link and the estimated channel response of the first communication link; and

selecting the at least one spatial channel from among the plurality of spatial channels based on the SNRs of the plurality of spatial channels.

191. The method of claim 190, wherein the at least one spatial channel is further selected based on a water-filling procedure, and wherein the at least one rate is determined based on SNR of the at least one spatial channel and the water-filling procedure.

192. The method of claim 188, wherein the MIMO system utilizes orthogonal frequency division multiplexing (OFDM).

193. The method of claim 192, wherein a plurality of spatial channels are obtained for each of a plurality of subbands, wherein a plurality of wideband spatial channels are formed by the plurality of spatial channels of the plurality of subbands, each wideband spatial channel including one spatial channel of each of the plurality of subbands.

194. The method of claim 193, wherein at least one wideband spatial channel is selected for data transmission based on SNRs for the plurality of spatial channels of the plurality of subbands.

195. The method of claim 194, wherein the at least one wideband spatial channel is further selected based on channel inversion to achieve similar SNRs across the plurality of subbands of each wideband spatial channel.

196. The method of claim 188, wherein the channel response of the first communication link is estimated based on a steered pilot received via a plurality of eigenmodes of the first communication link, and wherein each of the at least one spatial channel corresponds to one of the plurality of eigenmodes.

197. An apparatus in a wireless time division duplex (TDD) multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

a controller operative to estimate a channel response of a first communication link and to determine at least one rate for at least one spatial channel of a second communication link, one rate for each spatial channel, based on the estimated channel response of the first communication link; and

a transmit data processor operative to process data based on the at least one rate for transmission on the at least one spatial channel of the second communication link.

198. The apparatus of claim 197, wherein the controller is further operative to estimate signal-to-noise-and-interference ratios (SNRs) of a plurality of spatial channels of the second communication link based on a noise estimate for the first communication link and the estimated channel response of the first communication link, and to select the at least one spatial channel from among the plurality of spatial channels based on the SNRs of the plurality of spatial channels.

199. The apparatus of claim 198, wherein the controller is further operative to select the at least one spatial channel based on a water-filling procedure, and to determine the at least one rate based on SNR of the at least one spatial channel and the water-filling procedure.

200. The apparatus of claim 197, wherein the MIMO system utilizes orthogonal frequency division multiplexing (OFDM).

201. The apparatus of claim 200, wherein a plurality of spatial channels are obtained for each of a plurality of subbands, wherein a plurality of wideband spatial channels are formed by the plurality of spatial channels of the plurality of subbands, each wideband spatial channel including one spatial channel of each of the plurality of subbands.

202. An apparatus in a wireless time division duplex (TDD) multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

means for estimating a channel response of a first communication link;

means for determining at least one rate for at least one spatial channel of a second communication link, one rate for each spatial channel, based on the estimated channel response of the first communication link; and

means for transmitting data on the at least one spatial channel of the second communication link at the at least one rate.

203. The apparatus of claim 202, further comprising:

means for estimating signal-to-noise-and-interference ratios (SNRs) of a plurality of spatial channels of the second communication link based on a noise estimate for the first communication link and the estimated channel response of the first communication link; and

means for selecting the at least one spatial channel from among the plurality of spatial channels based on the SNRs of the plurality of spatial channels.

204. The apparatus of claim 203, wherein the at least one spatial channel is further selected based on a water-filling procedure, and wherein the at least one rate is

determined based on SNR of the at least one spatial channel and the water-filling procedure.

205. The apparatus of claim 202, wherein the MIMO system utilizes orthogonal frequency division multiplexing (OFDM).

206. The apparatus of claim 205, wherein a plurality of spatial channels are obtained for each of a plurality of subbands, wherein a plurality of wideband spatial channels are formed by the plurality of spatial channels of the plurality of subbands, each wideband spatial channel including one spatial channel of each of the plurality of subbands.

207. A method of transmitting data in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

estimating a channel response of a first communication link;

determining at least one supported rate for at least one spatial channel of the first communication link based on the estimated channel response, one supported rate for each spatial channel, each supported rate indicating a maximum rate supported by the corresponding spatial channel for a predetermined level of performance;

sending the at least one supported rate via a second communication link to a transmitting entity;

receiving at least one selected rate for the at least one spatial channel, one selected rate for each spatial channel, each selected rate being equal to or less than the supported rate for the spatial channel; and

receiving data transmission on the at least one spatial channel of the first communication link at the at least one selected rate.

208. The method of claim 207, wherein the first communication link is an uplink and the second communication link is a downlink in the MIMO system.

209. The method of claim 207, wherein the estimated channel response of the first communication link includes signal-to-noise-and-interference ratios (SNRs) for a plurality of spatial channels of the first communication link, and wherein the at least one

spatial channel is selected from among the plurality of spatial channels based on the SNRs for the plurality of spatial channels.

210. The method of claim 209, wherein the at least one spatial channel is further selected based on a water-filling procedure, and wherein the at least one supported rate is determined based on SNR for the at least one spatial channel and the water-filling procedure.

211. An apparatus in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

a controller operative to estimate a channel response of a first communication link and to determine at least one supported rate for at least one spatial channel of the first communication link based on the estimated channel response, one supported rate for each spatial channel, each supported rate indicating a maximum rate supported by the corresponding spatial channel for a predetermined level of performance;

a transmit data processor operative to send the at least one supported rate via a second communication link to a transmitting entity;

a receive data processor operative to

receive at least one selected rate for the at least one spatial channel, one selected rate for each spatial channel, each selected rate being equal to or less than the supported rate for the spatial channel, and

process data transmission received on the at least one spatial channel of the first communication link at the at least one selected rate.

212. The apparatus of claim 211, wherein the estimated channel response of the first communication link includes signal-to-noise-and-interference ratios (SNRs) for a plurality of spatial channels of the first communication link, and wherein the controller is operative to select the at least one spatial channel from among the plurality of spatial channels based on the SNRs for the plurality of spatial channels.

213. The apparatus of claim 212, wherein the controller is operative to further select the at least one spatial channel based on a water-filling procedure and to determine the at least one supported rate based on SNR for the at least one spatial channel and the water-filling procedure.

214. An apparatus in a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

means for estimating channel response of a first communication link;

means for determining at least one supported rate for at least one spatial channel of the first communication link based on the estimated channel response, one supported rate for each spatial channel, each supported rate indicating a maximum rate supported by the corresponding spatial channel for a predetermined level of performance;

means for sending the at least one supported rate via a second communication link to a transmitting entity;

means for receiving at least one selected rate for the at least one spatial channel, one selected rate for each spatial channel, each selected rate being equal to or less than the supported rate for the spatial channel; and

means for receiving data transmission on the at least one spatial channel of the first communication link at the at least one selected rate.

215. The apparatus of claim 214, wherein the estimated channel response of the first communication link includes signal-to-noise-and-interference ratios (SNRs) for a plurality of spatial channels of the first communication link, and wherein the at least one spatial channel is selected from among the plurality of spatial channels based on the SNRs for the plurality of spatial channels.

216. The apparatus of claim 215, wherein the at least one spatial channel is further selected based on a water-filling procedure, and wherein the at least one supported rate is determined based on SNR for the at least one spatial channel and the water-filling procedure.